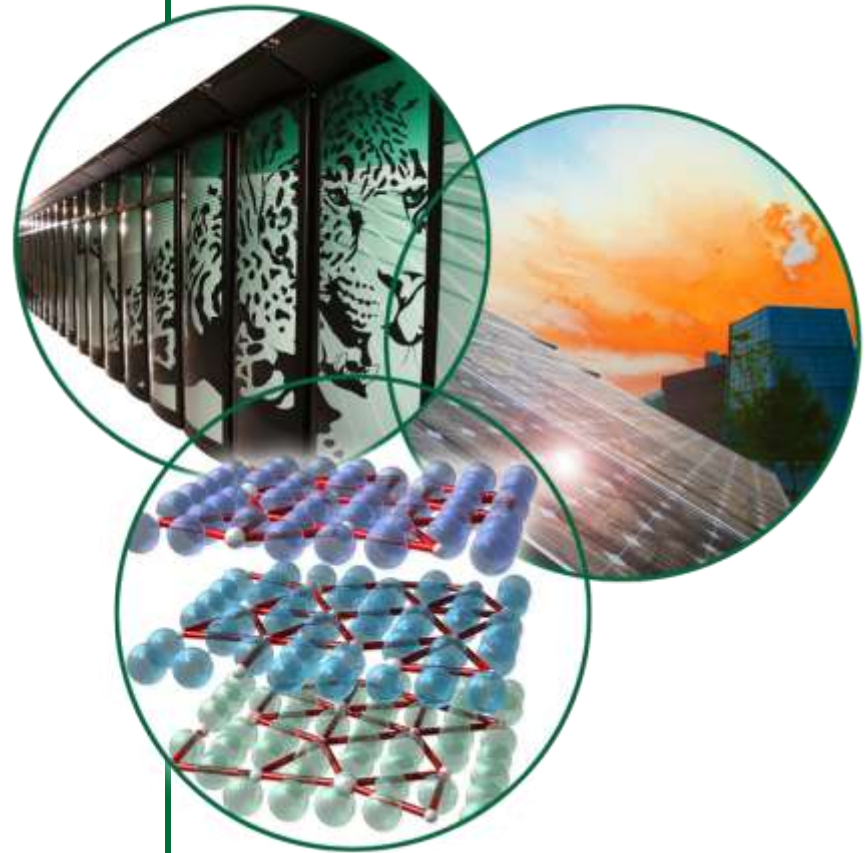


The SCALE Verified, Archived Library of Inputs and Data – (VALID)

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Outline

1. Purpose of VALID
2. Procedure philosophy
3. Procedure Highlights
4. Future plans for VALID
5. Conclusion

Purpose of VALID

- VALID fulfills at least two purposes for different groups of people
- Original purpose at ORNL
 - Generate high quality, reliable models under a QA plan independent of particular projects
 - Review models to ensure correctness
 - Eliminate duplication of effort and files
- Global reach of VALID
 - Experiments archived in VALID are provided to ICSBEP for inclusion with IHECSBE (input, output, SDF)
 - More than 250 cases from VALID on 2012 IHECSBE
 - Provided for screening, user responsible for QA of files used in safety analysis

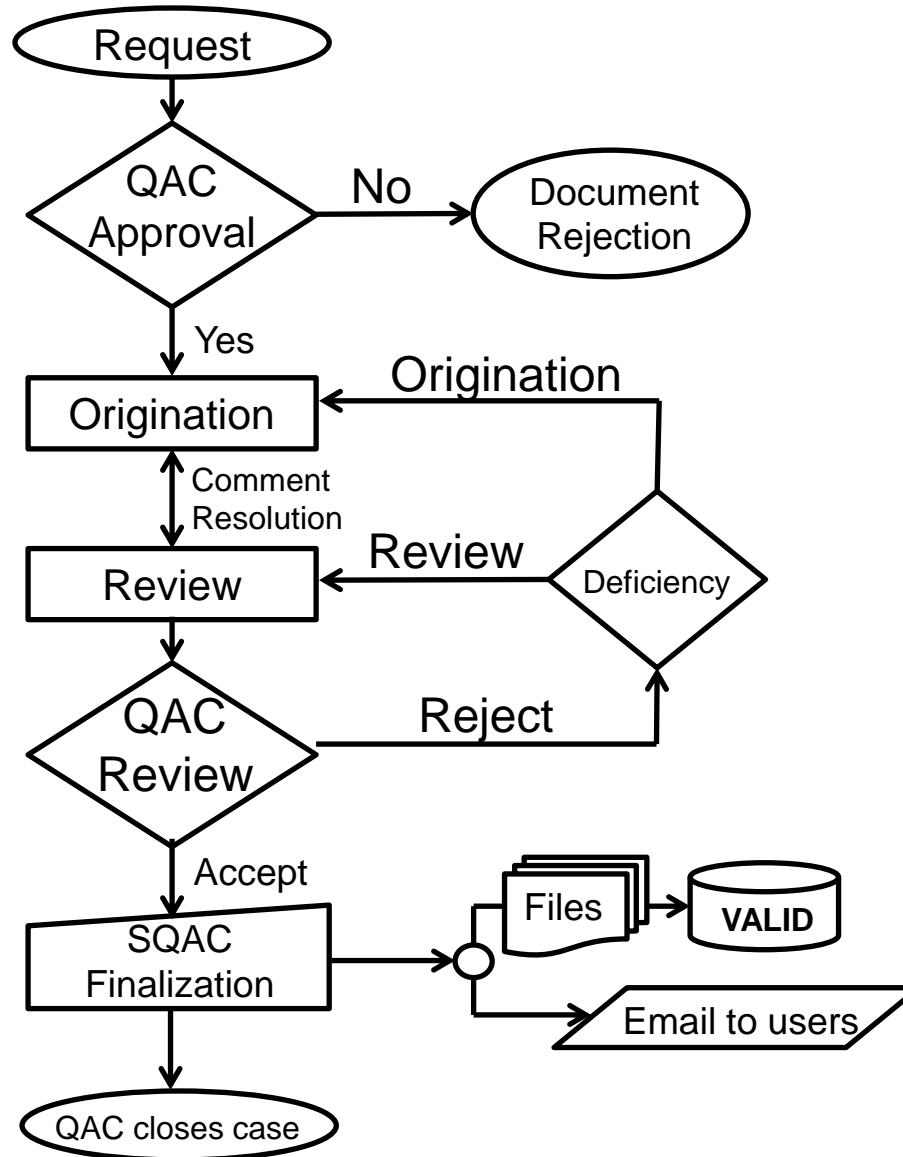
Procedure Philosophy

- Principle is two independent, qualified people prepare and review the model
- Same as 10CFR50 Appendix B, DOE Order 414.1D
- Dual, independent check is primary barrier to errors in the library
- Qualification controlled by QA Coordinator (QAC)
 - Individuals must also meet SCALE QA requirements
 - Guidelines included in newest revision of procedure
- Independence of performers from line management

Procedure Highlights

- Process overview/responsibilities
 - Requestor can be anyone – just ask for an experiment
 - Originator – build high-quality model using acceptable references
 - Reviewer – thorough review of models and documentation
 - QAC – Overall responsibility, assignment of performers
- Parameters typically included and checked (IHESCBCE eval.)
 - k_{eff} value for each case, checked to expected and sample results
 - Sensitivities checked with direct perturbations
 - Modeling approximations, esp. unit cell modeling in MG calcs

Procedure Overview



User Responsibilities

- Two primary user responsibilities
 - Appropriate use of models and data from the library
 - Notify QAC if errors or discrepancies are identified
- External users must provide QA and/or justification for using files from VALID distributed on IHECSBE
- Files are *not* covered for use in safety analysis

Qualification

- No fixed process or direct testing for qualification
- Originator
 - Experienced user of the code(s) being used
 - Review VALID procedure and overall SCALE QAP
 - Unqualified person can do work if it is reviewed and officially submitted by a qualified originator
- Reviewer
 - More experienced user of code(s), also familiar with methodologies and potential vulnerabilities
 - Typically will have been an originator at least once

Future Plans for VALID

- More ICSBEP evaluations
 - NCSP provides funding for new NCSP-sponsored evaluations to be added to the library as they're added to the Handbook
 - Some added through other projects for various sponsors
 - Potentially leverage work being done at OECD-NEA data bank
 - Ian Hill et al. paper for ANS winter meeting
- Additional data types
 - Currently TRITON models for radiochemical assay data from Yucca Mountain work are in VALID
 - Task on-going to add TRITON model updates to SCALE 6.1 and ENDF/B-VII
 - Shielding benchmarks, ORIGEN (ARP) libraries, applications?

Conclusions – VALID Inventory

IHECSBE experiments

Experiment Class	Evaluations Included	Total Number of SDFs Available
TSUNAMI-3D Cases from KENO V.a		
HEU-MET-FAST	-015, -016, -017, -018, -019, -020, -021, -025, -030, -038, -040, -065	18/22*
HEU-SOL-THERM	-001, -013, -014, -016, -028, -029, -030	52
IEU-MET-FAST	-002, -003, -004, -005, -006, -007, -008, -009	8/11*
LEU-COMP-THERM	-001, -002, -010, -017, -042, -050, -080	108
LEU-SOL-THERM	-002, -003, -004	19
MIX-COMP-FAST	-005, -006	2
MIX-COMP-THERM	-001, -002, -004	21
PU-MET-FAST	-001, -002, -005, -006, -008, -010, -018, -022, -023, -024	10
PU-SOL-THERM	-001, -002, -003, -004, -005, -006, -007, -011, -020	81
TSUNAMI-3D Cases from KENO-VI		
HEU-MET-FAST	-005, -008, -009, -010, -011, -013, -024, -080, -086, -092	24
IEU-MET-FAST	-019	2
MIX-COMP-THERM	-008	28

*Includes detailed and simple models for the same evaluation in some cases.

Conclusions – VALID Inventory

RCA Models

Reactor	Measurement Laboratory	Experimental Program	Assembly Design	No. of Samples/ Fuel Rods	Enrichment (wt % ²³⁵ U)	Burnup (GWd/MTU)
Trino Vercellese	Ispra, Karlsruhe	JRC	15 × 15	15/5	2.72, 3.13, 3.897	7.2–17.5
	Ispra, Karlsruhe	JRC	15 × 15	16/5	3.13	12.9–25.3
Obrigheim	Ispra, Karlsruhe	JRC	14 × 14	10/6	3.00	17.1–37.5
	ITU, IRCh, WAK, IAEA	ICE	14 × 14	5/5	3.13	27.0–29.4
H. B. Robinson-2	PNNL	ATM-101	15 × 15	4/1	2.561	16.0–31.7
Turkey Point-3	Battelle-Columbus	NWTS	15 × 15	5/1	2.556	30.5–31.6
Calvert Cliffs-1	PNNL, KRI	ATM-104	14 × 14	3/1	3.038	27.4–44.3
	PNNL	ATM-103	14 × 14	3/1	2.72	18.7–33.2
	PNNL, KRI	ATM-106	14 × 14	3/1	2.453	31.4–46.5
Takahama-3	JAERI	JAERI	17 × 17	13/3	2.63, 4.11	17.4–46.2
TMI-1	ANL	DOE YMP	15 × 15	11/1	4.013	44.8–55.7
	GE-VNC	DOE YMP	15 × 15	8/3	4.657	22.8–29.9
Gösgen	SCK•CEN, ITU	ARIANE	15 × 15	3/2	3.5, 4.1	29.1–59.7
GKN II	SCK•CEN	REBUS	18 × 18	1/1	3.8	54.1

Conclusions

- Allows development and retrievability of high quality models for a range of types of data
- Currently contains more than 350 critical experiments with SDFs and more than 100 TRITON models for RCA samples
 - Critical experiment data distributed with IHECSBE (DICE)
- Potential for expansion in the future to include more types of data
- Considering methods for greater availability of models and data to the world, potentially via the SCALE web site

SDFs in 2012 Handbook

(found in /Dice/data/ornl)

Experiment Class	Evaluations Included	Total Number of SDFs Available
TSUNAMI-3D Cases from VALID		
HEU-MET-FAST	-005, -008, -009, -010, -011, -013, -015, -016, -017, -018, -019, -020, -021, -024, -025, -030, -038, -040, -065, -080	33
HEU-SOL-THERM	-001, -013, -014, -016, -028, -029, -030	52
IEU-MET-FAST	-002, -003, -004, -005, -006, -007, -008, -009, -019	10
LEU-COMP-THERM	-001, -002, -042, -049, -050	56
LEU-SOL-THERM	-002, -003, -004	19
MIX-COMP-THERM	-001, -002, -004	21
PU-MET-FAST	-001, -002, -005, -006, -008, -010, -018, -022, -023, -024	10
PU-SOL-THERM	-001, -002, -003, -004, -005, -006, -007, -011	62
TSUNAMI-3D Cases Distributed Prior to VALID		
MIX-COMP-FAST	-001	1
U233-COMP-THERM	-001	3
U233-SOL-THERM	-002, -003, -004, -005, -006, -009, -012, -013, -014, -016, -017	147
TSUNAMI-1D Cases Distributed Prior to VALID		
U233-MET-FAST	-001, -002, -003, -005, -006	8
U233-SOL-INTER	-001	29
U233-SOL-MIXED	-001, -002	8
U233-SOL-THERM	-001, -005, -008, -011, -012, -015	35